

**Committee Activity Report**  
**29 June, 1999**  
**CIE TC 2-39**  
**Geometric Tolerances for Color Measurement**

**Terms of Reference**

Compile a technical report and recommendations specifying the geometric tolerances for the various geometries in colorimetry, including 0/45, 0/d and others. Parts of this technical report may be suitable for inclusion in a CIE standard specifying several geometric tolerance levels.

**Working Program**

Utilize ISO 5/1 and ASTM E 1767 to develop a system of specifications for the geometry of color measurements. Define the specifications in the following order: Reflectance factor (t/8, d/8, d/0), radiance factor (45/0) and transmittance geometries (0/0, d/0). Specifications will be developed via computer simulation & verified experimentally.

**Current Committee Membership:**

A Bittar (New Zealand), J. Verril (United Kingdom), L. Hanssen (USA), G. Baba (Japan), B. Jordon (Canada), J. Zwinkels (Canada), H. Terstiege (Germany), N. Johnson (USA), D. Rich (USA), Chairman, R. Fisch (USA), J. Pietrzykowski (Poland), A. Kravetz (USA), J. Ladson (USA), J. Decarreau (France)  
Consulting Member: W. Erb (Germany)

**Status**

The Committee met for the fifth time just prior to the CIE Division 2 meeting in Warsaw, Poland at the Technical University of Warsaw. Five committee members and six guests were present. An agenda was handed out and approved. The minutes and activity report from 1998 were reviewed and approved. There were some questions about the terminology issues that were decided at the last meeting. In reviewing the terminology it was suggested by committee members that the final report have a separate section on terminology, even though this is not standard in a CIE report. The TCC agreed to draft such a section. It was reported that none of the action items shown in the 1998 Activity Report had been fulfilled. The TCC took partial responsibility for this as he had changed affiliations and had not been able to retrieve his CIE committee documents until just recently. The members from NIST and 3M have also forgotten about their action items and the TCC was unable to find the documents to remind them. This next year will be better.

A first draft of the final report was distributed for discussion. Discussions during the meeting resulted in the following actions:

1. There was a general agreement on the reference specifications for the three geometries described in the draft.

2. General comments included a) the report needs more figures. N. Johnson agreed to send drawings and/or PowerPoint files to include in the document; b) the scope needs to be rewritten so as to more clearly identify that the three levels of tolerances do not represent “good, bad, worse” but rather ranges of geometries suitable to various types of materials, surface effects and applications. More Lambertian materials may be successfully characterized on any of the geometries but difficult to measure specimens or material standards may require one geometry rather than another.
3. It was suggested that one needs to know how the cone angles are distributed across the sample port. To do this, there should be some specification and tolerances on the size of the specimen port for any set of influx and efflux angles. One way to do this would be to analyze the geometric design of an instrument, ray by ray. The TCC feels this would be too restrictive on the color community. It was then suggested that the report change from a two parameter (influx : efflux) angle based specification to a three parameter (influx aperture, efflux aperture, specimen aperture).
4. One committee member suggested that the report include two different specific examples of a design of each reference geometry to illustrate the use of the methods described in the final report.
5. There was a lot of discussion about how to handle reference specification for difficult to measure specimens, such as metallic flake paints or retroreflective sheeting. The TCC will review this issue and draft a position to be included in the scope of the next draft.

#### Action Items:

1. During the next few months, the chairman will prepare a second draft of the final report and distribute the draft to committee members for comment.
2. NIST, Murakami and 3M have volunteered to supply some measurement data on standard and practical materials (matte, semi-gloss, glossy paint, ceramic tiles, plastics) to verify the reference geometry and the effect of the tolerances.
3. D. Couzin will talk to C. McCamy about how to transform the ISO 5 geometry system into a three parameter system and draft a defining paragraph to be added to the final report.
4. Ted Early and Maria Nadal at NIST will take the place of Leonard Hansen from NIST on the committee.
5. The TCC will contact Greg McGee of Labsphere about materials on specifying and verifying the design of integrating spheres.
6. The next draft will be written and distributed by 15 December, 1999.

The committee desires to hold the next meeting in conjunction with the ASTM E-12 Color and Appearance meeting, to be held in Toronto, Canada in June of 2000. The TC will not be meeting during the Division meetings at NPL in April 2000.

Respectfully submitted,

Danny Rich, TCC